



# **Urban Challenge**

Proposer Information Pamphlet (PIP)

Broad Agency Announcement (BAA) 06-36

May 1, 2006

**Urban Challenge**  
**Proposer Information Pamphlet**  
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# **1. Program Description**

The Defense Advanced Research Projects Agency (DARPA) seeks to advance the state of knowledge in the area of ground robotic vehicles by demonstrating a field of vehicles operating fully autonomously in a complex urban environment that includes moving vehicular traffic.

This Proposer Information Pamphlet (PIP) supplements Broad Agency Announcement (BAA) 06-36 and provides information on the program vision, plan, objectives, and administrative details required for proposal submission.

## **1.1 Vision**

The Urban Challenge is an outgrowth of the DARPA Grand Challenge 2005 autonomous vehicle competition conducted in October 2005. This event focused on the development of autonomous vehicles that operate in an off-road environment with only limited interaction with other vehicles. Urban Challenge extends this concept to autonomous vehicles that safely execute missions in a complex urban environment with moving traffic.

In the National Defense Authorization Act for Fiscal Year 2001, Public Law 106-398, Congress mandated in Section 220 that “It shall be a goal of the Armed Forces to achieve the fielding of unmanned, remotely controlled technology such that . . . by 2015, one-third of the operational ground combat vehicles are unmanned.” With the Urban Challenge, DARPA is focused on the advancement of technology to address the operational challenges implicit in the Congressional mandate. Safe and effective operation in moving traffic is a basic requirement for all future military missions for ground autonomous vehicles.

## **1.2 Technical Goal**

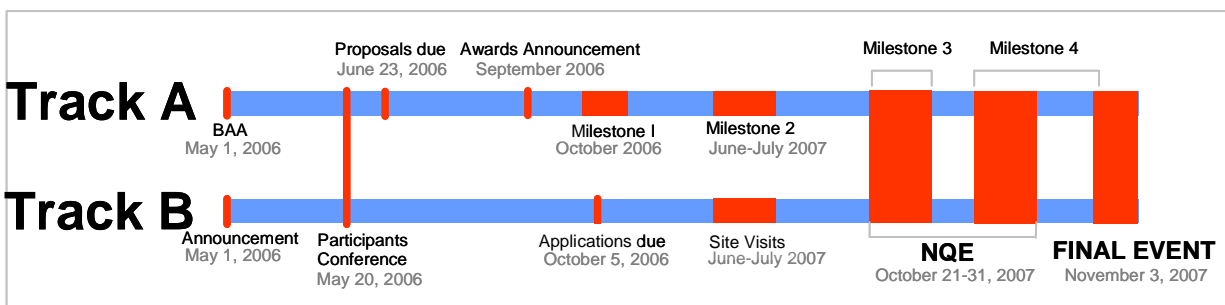
The Urban Challenge will demonstrate a field of autonomous ground vehicles that can safely and effectively execute a militarily relevant mission of approximately 60 miles in less than 6 hours in an urban area with moving traffic.

## **1.3 Program Plan**

The Urban Challenge autonomous vehicle competition ([www.darpa.mil/grandchallenge](http://www.darpa.mil/grandchallenge)) has two tracks, A and B, through which teams may enter the competition. Teams can participate in either track, but not both. In both tracks, teams are eligible to receive funding from DARPA for vehicle development.

On Track A, teams submit proposals under BAA 06-36 to receive technology development awards up to \$1,000,000. DARPA will evaluate the proposals using the procedures described in the BAA and this PIP and reserves the right to select all, some, or none for award. Teams selected will be tested at four milestones to ensure adequate progress for continuation in the program. Milestone completion will be determined using the exit criteria detailed in Section 2.4. The vehicle demonstrations for Milestones 3 and 4 will take place at the National Qualification Event (NQE). Teams that successfully complete Milestone 4 will attempt the Urban Challenge final event on November 3, 2007. All milestone events will take place in the United States.

On Track B, teams submit an application and demonstration video and participate in two preliminary events, the site visit and NQE, to qualify for the Urban Challenge final event. The 5-minute demonstration video will be evaluated using standardized criteria to select teams for site visits by DARPA personnel. At the site visits, the vehicles will be tested using the criteria in Section 2.4.2, and DARPA will select some, all, or none for invitation to NQE as Urban Challenge semi-finalists. Semi-finalists will receive a \$50,000 cash award if the invitation is accepted and the team competes at NQE. At NQE, semi-finalists will be tested using the criteria in Sections 2.4.3 and 2.4.4, and DARPA will select some, all, or none as Urban Challenge finalists. Finalists will be invited to participate in the Urban Challenge final event and will receive a \$100,000 award if the invitation is accepted and the team competes in this event. Details for Track B participation are given at [www.darpa.mil/grandchallenge](http://www.darpa.mil/grandchallenge).



**Figure 1.** Relationship between Tracks A and B.

As shown in Figure 1, participants from both tracks come together at the Urban Challenge National Qualification Event (NQE), where all teams will compete on an equal footing.

Teams that submit a proposal under BAA 06-36 but are not selected may enter Track B by submitting an application before October 5, 2006. The application process is described at [www.darpa.mil/grandchallenge](http://www.darpa.mil/grandchallenge).

The information in this PIP is primarily applicable to track A. Track B applicants should consult [www.darpa.mil/grandchallenge](http://www.darpa.mil/grandchallenge) for additional information.

Proposers must identify an individual to act as the team leader. This individual must hold U.S. citizenship and be at least 21 years of age on the date the proposal is signed.

All awards planned under this program are for the development and demonstration of complete autonomous ground vehicles. No awards are planned that are focused solely on the development of component or subsystem technologies.

All prize monies are subject to the availability of Congressional appropriations and Congressional extension of DARPA's prize authority.

## 1.4 Management Approach

The DARPA program manager will assemble a technical support team that will include Government civilian personnel, military personnel, contracted subject matter experts, and

contracted support staff to participate in technical interchange meetings, milestone meetings, and demonstrations.

### **1.5 Teaming and Eligibility**

DARPA will accept only one proposal per prime contractor for the program, but organizations or individuals may participate as subcontractors on more than one team. A team that is selected under BAA 06-36 will participate on Track A and may not enter additional vehicles for either track.

Awards will be made on the basis of full and open competition. Government organizations may not respond to BAA 06-36. These organizations may compete on Track B, provided such competition is within the organization's charter and consistent with applicable statutes.

### **1.6 Procurement Mechanism**

Proposers will specify the use of a conventional Federal Acquisition Regulation (FAR) contract or a Section 845, Other Transactions (OT) for Prototypes Agreement. Proposers who specify the use of an OT must indicate in the proposal whether they qualify as a nontraditional Defense contractor, have teamed with a nontraditional Defense contractor making a significant contribution, or are providing a one-third cost share for this effort. Awardees will be required to meet the requirements of Section 845(d), which are discussed in Section 3.2.10 and Appendix A. An OT model agreement is provided as Appendix B. FAR contracts will be fixed-price efforts with payable milestones. Proposals should not include profit or fee.

### **1.7 Funding and Period of Performance**

DARPA intends to make multiple awards of up to \$1 million total funding for each effort, including cost share. The period of performance will extend from the agreement award date to December 31, 2007.

### **1.8 Intellectual Property (IP)**

The Government requires Government purpose rights (GPR) to milestone reports and other documentation submitted at milestone meetings and technical interchange meetings.

The Government requires GPR to all elements of intellectual property for this program created in whole or in part using Government funding. This property may include trade secrets, plans, designs, documentation, software, algorithms, and other intellectual property. A catalog of pre-existing noncommercial intellectual property that will be used for the program must be submitted as Attachment E of the proposal as described in Section 3.2.13.

GPR is defined as in Defense Federal Acquisition Regulation Supplement (DFARS) clause 252.227-7013:

“Government purpose rights” means the rights to—

- (i) Use, modify, reproduce, release, perform, display, or disclose technical data within the Government without restriction; and

- (ii) Release or disclose technical data outside the Government and authorize persons to whom release or disclosure has been made to use, modify, reproduce, release, perform, display, or disclose that data for United States government purposes.

“Government purpose” refers to any activity in which the U.S. Government is a party, including cooperative agreements with international or multi-national defense organizations, or sales or transfers by the U.S. Government to foreign governments or international organizations. Government purposes include competitive procurement, but do not include the rights to use, modify, reproduce, release, perform, display, or disclose technical data for commercial purposes or authorize others to do so.

The Government requires unlimited rights to autonomous vehicle technical data, as described in the technical paper and final report. This data must be sufficient to enable the Government to inform stakeholders of technical accomplishments, allow validation of technical claims by independent experts, facilitate discussion of technical challenges within the broader technical community, and generate program advocacy.

“Unlimited rights” refers to the rights to use, duplicate, release, modify, or disclose data in whole or in part, in any manner and for any purposes whatsoever, and to permit others to do so.

## **1.9 Waiver and Release of Indemnity and Liability**

As a condition for award, program performers will sign and notarize a waiver and release of indemnity and liability. This document is provided in Appendix C and will be submitted with the proposal as Attachment D.

# **2. Statement of Objectives**

## **2.1 Overview**

The primary objective of the Urban Challenge is to demonstrate safe, effective autonomous ground vehicle navigation over a 60-mile, 6-hour mission in urban traffic, while conforming to California state traffic laws and established traffic conventions.

All performers on Track A must complete four milestones to be eligible for the full award amount. Successful completion of all milestone criteria will be determined by DARPA officials. Teams will be notified according to the schedule given in Section 2.4.

For proposers specifying the use of a FAR contract vehicle, this statement of objectives will form the basis of the statement of work to be incorporated in the FAR contract.

## **2.2 Vehicle Requirements**

The program emphasis is the demonstration of a vehicle capable of a complex set of behaviors, executed in a manner that ensures the safety of spectators, staff, other vehicles, objects in the environment, and the vehicle itself.

- Vehicle must be built upon a full-size stock chassis or have a documented safety record. Vehicles smaller than a midsize commercial automobile do not meet this requirement. Golf cart-type or all terrain vehicles (ATVs) do not meet this requirement.
- Vehicle must be convertible to and from autonomous operation and human operation within 5 minutes. Human operation may include teleoperation.
- Vehicle must be capable of integrating the DARPA-supplied E-stop and tracking system. Details are available at [http://www.darpa.mil/grandchallenge05/Estop\\_Guidance.pdf](http://www.darpa.mil/grandchallenge05/Estop_Guidance.pdf).
- Vehicle must be capable of navigating autonomously at 30 mph.
- Vehicle must be capable of avoiding stationary and moving obstacles while moving forward and in reverse.
- All sensors and navigation equipment must be fully contained within, or permanently attached to, the vehicle.
- Vehicle must be capable of loading a mission description file via a standard USB 2.0 flash drive.
- Vehicle must have directional signals, brake lights, and reverse lights. These lights must operate as required by California state law.
- Vehicle shall display a flashing amber warning light that is visible at all angles around the vehicle. The warning light shall operate when, and only when, the vehicle is in autonomous mode. The vehicle shall produce an intermittent warning sound that produces approximately 85 dBA at 10 feet when, and only when, the vehicle is operating autonomously. The vehicle may not commence movement until the warning sound and warning light have been in operation for 5 seconds.
- Vehicle must comply with all applicable local, state, and Federal laser, electromagnetic emission, and acoustic safety regulations including OSHA 29 CFR 1926.54, OSHA 29 CFR 1910.97, and OSHA 29 CFR 1910.95. All emitters must pose no hazard of any kind to humans near the vehicle.
- Vehicle is prohibited from using wireless connections in autonomous mode except from navigation systems such as GPS. The use of wireless signals for teleoperation or diagnostics is allowed when the vehicle is not in autonomous mode. A vehicle may emit and receive signals to sense the environment. Vehicles may record video or other data onboard for later review.
- Vehicle must have a wireless emergency stop (E-stop) system for use at the Milestone 2 demonstration.
- Vehicle must be equipped with an externally-actuated manual E-stop pushbutton capability that, upon activation, promptly brings the vehicle to a complete stop and disables the vehicle. At least one pushbutton and its labeling must be easily visible and accessible on each side of the vehicle.



## 2.3 Objectives

The urban environment holds many challenges for autonomous vehicle navigation, including narrow lanes, sharp turns, traffic-congested intersections, and obstacles such as curbstones, utility poles, hydrants, blocked streets, parked vehicles, trees, pedestrians, and moving vehicles.

Vehicles will demonstrate the following capabilities over the course of the Urban Challenge program:

- Complete a mission defined by an ordered series of checkpoints in a complex route network. The vehicle will have 5 minutes to process a mission description before attempting the course.
- Interpret static lane markings (e.g., white and yellow lines) provided with the route network definition file and behave in accordance with applicable traffic laws and conventions.
- Exhibit context-dependent speed control to ensure safe operation, including adherence to speed limits.
- Exhibit safe-following behavior when approaching other vehicles from behind in a traffic lane. This includes maintaining a safe-following distance.
- Exhibit safe check-and-go behavior when pulling around a stopped vehicle, pulling out of parking spot, moving through intersections, and in situations where collision is possible.
- Stay on the road and in a legal and appropriate travel lane while en route, including around sharp turns, through intersections, and while passing. The route network definition file will specify the GPS coordinates of the stop signs.
- Navigate safely in areas where GPS signals are partially or entirely blocked.
- Follow paved and unpaved roads and stay in lane with very sparse or low accuracy GPS waypoints.
- Change lanes safely when legal and appropriate, such as when passing a vehicle or entering an opposing traffic lane to pass a stopped vehicle. Vehicles must not pass other vehicles queued at an intersection.
- Merge safely with traffic moving in one or more lanes after stopping at an intersection.
- Pull across one lane of moving traffic to merge with moving traffic in the opposing lane.
- Stop safely within 1 meter of the stop line at a stop sign intersection and proceed without excessive delay (less than 10 seconds) according to intersection precedence rules.
- Exhibit proper queue behavior at an intersection, including stopping at a safe distance from other vehicles and stop-and-go procession to the stop line without excessive delay.
- Navigate toward a destination in a large, open area where minimal or no GPS points are provided, as in loading dock areas or parking lots. These areas may contain fixed obstacles such as parked vehicles and moving obstacles including other vehicles and pedestrians.

- Safely pull into and back out of a specified parking space in a parking lot.
- Safely execute one or more three-point turning maneuvers to effect a U-turn.
- Dynamically re-plan and execute the route to a destination if the primary route is blocked or impassable.

The following behaviors or capabilities are outside the scope of this program:

- Recognition of external traffic signals such as traffic lights and stop signs through the use of sensors. The Urban Challenge route network definition file will include information such as stop sign locations, nominal lane width, lane markings, and parking spot locations.
- Behaviors necessary for highway driving such as high speed passing or high speed merge at an onramp. Speed limits for the Urban Challenge will be 30 mph or less.
- Driving in difficult off-road terrain is outside the scope of the program. Off-road navigation in an unpaved area, travel along roads with potholes, and travel along a dirt road are within scope.

To complete the requirements for the Urban Challenge, each vehicle will complete multiple missions over a defined route network. The route network definition specifies accessible roads and all areas in which the vehicle may travel. A mission is a series of checkpoint locations that must be passed over sequentially by the vehicle. The path between checkpoints is not specified.

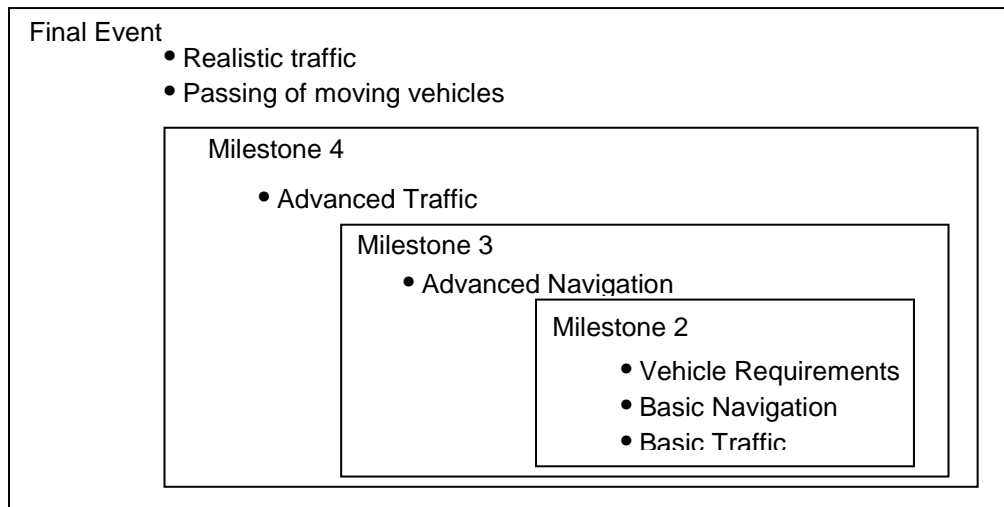
DARPA will provide the Route Network Definition File (RNDF) that includes all accessible road segments and provides information such as waypoints, stop sign locations, lane widths, checkpoint locations, and parking spot locations. The route network has no implied start or end points. Road blockages will not be indicated in the RNDF.

DARPA will also provide a Mission Data File (MDF) containing the checkpoints that must be reached and maximum and minimum speed limits for the road segments. MDFs will be provided by DARPA for all Urban Challenge test events.

A document specifying the format of the RNDF and MDF will be posted on [www.darpa.mil/grandchallenge](http://www.darpa.mil/grandchallenge).

## **2.4 Program Milestones**

Team progress will be evaluated by performance at a series of mandatory milestone events. These milestones have associated deliverables, exit criteria, and payment for completion. Continuation in the program is contingent upon team performance at these milestone events. Performers that do not achieve the required level of performance at each milestone may be discontinued from the program or may be allowed to continue in the program with a delay in the milestone payment, at DARPA's discretion.



**Figure 2.** Relationship between milestone criteria

Figure 2 shows the milestone criteria as a set of nested boxes. The criteria for Milestone 4, for example, include all the criteria from Milestones 2 and 3. The capabilities necessary to complete the course at the Urban Challenge final event will be demonstrated at early stages, except the ability to pass a moving vehicle. The final event will cover a much longer distance than the milestone tests, will involve a speed component, and will include the unpredictability of realistic traffic.

#### **2.4.1 Milestone 1**

Purpose: Kickoff meeting

Date: Approximately 2 weeks after program award

Location: Performer site in the United States

Format: Performer presentations and demonstration

Special Preparation: none

Activities: Performer presentation of vehicle development and test plan, followed by optional field demonstration of baseline vehicle capabilities. This plan should discuss autonomous system theory of operation and associated technical risk.

Deliverables: Vehicle development plan and associated briefing material

Behaviors under test: none

Exit criteria: Delivery of concise but complete development plan including discussion of cost, schedule, and internal development milestones

Notification: Within 10 business days after milestone event

Milestone payment target: 50 % of Government share for OT; 50 % of award value for FAR contract

#### **2.4.2 Milestone 2**

Purpose: Site visit demonstration

Date: Between June 1 and July 15, 2007; maximum 4-hour test

Location: Performer test course in the United States

Format: Performer will demonstrate vehicle capabilities on a test course using a procedure that complies with DARPA requirements. DARPA officials will follow autonomous vehicle in a DARPA-supplied vehicle.

Special Preparation: Performer will create and mark a test course between 300m and 1000m in length per DARPA's specifications and submit to DARPA a course layout and route network demonstration file at least 30 days prior to the demonstration. Performer will provide a "traffic-vehicle" (including driver), and one additional control vehicle. Performer is responsible for safety plan and safe execution of the test.

Activities: Vehicle will perform safety test, navigation test (without moving traffic-vehicle) and traffic test (with moving traffic-vehicle). Specific test missions will be specified on-site by DARPA.

Deliverables: Technical paper written to DARPA specifications.

Vehicle requirements:

- Vehicle conforms to all requirements in Section 2.2.

Criteria for safety test:

- E-stop brings the vehicle traveling at 20 mph to a smooth, controlled, and complete rolling stop in less than 20 meters after E-stop activation

Criteria for basic navigation test:

- Vehicle is in autonomous mode and ready to begin run less than 5 minutes after receipt of the MDF from DARPA.
- Vehicle front bumper passes over each checkpoint in DARPA MDF in the correct lane and the correct sequence.
- Vehicle stays in travel lanes at all times unless exiting lane to avoid obstacle.
- Vehicle always stops so front bumper is within 1 meter of stop line at intersection.
- Vehicle always exhibits less than 10-second delay before proceeding at clear intersection.
- Vehicle exhibits safe behavior at all times to avoid collisions and near-collisions as judged by DARPA.
- Vehicle demonstrates ability to leave lane, pass a stopped car or obstacle, and return directly to travel lane. Complete maneuver takes place within 40 meters.
- Vehicle maintains a minimum safety separation of 8 meters fore and aft when executing a passing maneuver.
- Vehicle speed conforms to limits set in DARPA MDF.

Criteria for basic traffic test:

- Vehicle meets all criteria for navigation test.
- Vehicle exhibits proper precedence order at every intersection and does not proceed out of turn.
- Vehicle never comes closer than 15 meters when following a moving lead vehicle traveling at 15 mph on an urban course with 20 mph speed limit.
- Vehicle stays within 40 meters when following a moving lead vehicle traveling at 15 mph on an urban course with 20 mph speed limit.
- Vehicle stops between 5 and 10 meters behind a stopped lead vehicle.

Technical paper criteria: The technical paper should be structured and formatted for publication in a professional journal. It should describe the vehicle design including detailed descriptions of architecture, theory of operation, major subsystems, and vehicle behavior model and should offer a complete understanding of the performer's technical accomplishment.

Exit criteria:

- Vehicle meets vehicle requirements.
- Vehicle demonstrates that it meets all criteria for safety, basic navigation and basic traffic tests as directed by DARPA.
- Technical paper meets criteria and is accepted by DARPA.

Notification: Within 45 days after Milestone 2 event

Milestone payment target: 25 % of Government share for OT; 25 % of award value for FAR contract

### **2.4.3 Milestone 3**

Date: October 20 – 31, 2007

Location: NQE site in western United States

Format: Performer vehicle will demonstrate E-stop safety attempt to complete a mission across a DARPA-defined route network

Special preparation: Government will provide E-stop system after Milestone 2 notification.

Performer must integrate and test Government-furnished E-stop and tracking system prior to arrival at the test site

Deliverables: none

Criteria for safety test:

- Government-furnished E-stop is installed to allow Government to track system on the test course.
- Government-furnished E-stop brings the vehicle traveling at 20 mph to a smooth, controlled, and complete rolling stop in less than 20 meters after E-stop activation.

Criteria for advanced navigation test:

- Vehicle satisfies all navigation test criteria from Milestone 2.
- Vehicle exhibits correct parking lot behavior, including ability to pull forward into and reverse out of specified parking spot without collision and with less than 10 seconds of excess delay.
- Vehicle demonstrates ability to negotiate obstacle field safely and effectively, with no collisions and with less than 10 seconds of excess delay.
- Vehicle conducts maneuvers necessary to achieve objective checkpoints, including U-turns and route re-planning when roads are blocked. A U-turn may be effected through one or more three-point turns.
- Vehicle navigates roads with sparse or low-accuracy waypoints, including ability to stay in travel lane through road-following by sensing berms or road edges, or by any other sensor-based technique.

Exit criteria:

- Vehicle meets vehicle requirements and basic traffic test criteria from Milestone 2.
- Vehicle meets all criteria for safety and advanced navigation test for Milestone 3.

Notification: Within 48 hours after Milestone 3 event completion

Milestone payment target: 10 % of Government share for OT; 10 % of award value for FAR contract

#### **2.4.4 Milestone 4**

Date: October 20 – December 31, 2007

Location: NQE site in western United States

Format: Vehicle capabilities will be assessed in a series of tests to measure the ability to meet the program objectives. This milestone includes participation in the Urban Challenge final event

Special Preparation: none

Deliverables: Final report is due before December 31, 2007.

Criteria for advanced traffic test:

- Vehicle satisfies all requirements for the advanced navigation test from Milestone 3.
- Vehicle pulls safely into traffic, maintaining minimum 8 meters fore and aft spacing between vehicles at all times during maneuver.
- Vehicle does not exhibit excessive delay when pulling into traffic moving at constant speed. Vehicle should pull into the traffic lane when oncoming vehicles leave a gap of at least 10 seconds between vehicles.
- Vehicle exhibits safe behavior when making left turn across moving traffic and proceeds with less than 10 seconds excess delay.
- Vehicle navigates obstacle area safely and effectively in the presence of moving traffic, operating without collision and with less than 10 seconds excess delay.
- Vehicle navigates parking area in presence of moving traffic including parking in designated location safely and effectively, without collision and with less than 10 seconds excess delay.

Final report requirements:

- Concise and complete report of all technical accomplishments, including lessons learned
- Full report and description of intellectual property created under the Urban Challenge program as described in Section 3.2.13.

Exit criteria:

- Vehicle meets exit criteria from Milestone 3.
- Vehicle meets Milestone 4 advanced traffic test requirements.
- Vehicle attempts Urban Challenge final event.
- Submission of final report that meets DARPA requirements

Notification: Within 15 days after receipt of all deliverables

Milestone payment target: 15 % of Government share for OT; 15 % of award value for FAR contract

## **2.5 Technical Interchange Meetings**

During the course of the program, DARPA may coordinate with the performer to schedule one or two technical interchange meetings at the performer site or by teleconference as directed by DARPA. These meetings are informal in nature and will allow the Government to assess performer progress toward meeting program objectives.

## **2.6 Information Release**

Research performed under this program is considered contracted fundamental research per DoD Instruction 5230.27 “Presentation of DoD-Related Scientific and Technical Papers at Meetings,” (<http://www.dtic.mil/whs/directives/corres/pdf2/i523027p.pdf> ) and as such is not subject to prior Government review.

Although the Urban Challenge program is being conducted under the guidelines of fundamental research, performers are responsible for compliance with the Arms Export Control Act, 22 U.S.C. 2751-2794, and the Export Administration Act, 50 U.S.C. App 2401-2420. Performers must determine if any proposed technology development is subject to applicable export laws and regulations (such as the International Traffic In Arms Regulations (ITAR) 22 C.F.R. 120-130). In addition, awardees shall notify DARPA if any export control laws and regulations apply to proposed technology prior to such export (section 3.2.8.5). Public release of information that may be restricted is subject to prior Government review, according to the procedures available at <http://www.darpa.mil/tio>.

# **3. Proposal Requirements**

## **3.1 Overview**

Clear, concise prose is required with supporting tables, diagrams, or illustrations. Classified information may not be submitted as part of the proposal.

## **3.2 Proposal Format**

The proposal must conform to the format and page limits detailed below, including section headings. Proposal should not exceed 35 pages. This page limit does not include the attachments. Non-conforming proposals will not be reviewed.

### **3.2.1 Cover Letter**

The cover letter (one page maximum) should be addressed to the DARPA program manager from the team leader. The letter should indicate the contact information including e-mail address for the team leader, competitive team name, team website address, and description of the team. Information provided by teams that receive awards will be released to the public on the [www.darpa.mil/grandchallenge](http://www.darpa.mil/grandchallenge) website. For purposes of the page count, the cover letter is considered part of the proposal body.

### **3.2.2 Cover Page**

The cover page (1 page maximum) should contain the proposal title, organization name, and contact information for the technical and administrative points of contact. An authorized representative of the proposer must sign the cover page of the proposal.

### **3.2.3 Executive Summary**

The executive summary (1 page maximum) should provide a synopsis of the proposal including technical approach, key benefits, key subcontractors, and management approach.

### **3.2.4 Table of Contents**

This section (1 page maximum) provides a table of contents for the document.

### **3.2.5 Abbreviations**

The acronym list (1 page maximum) defines all abbreviations used in the document.

### **3.2.6 Technical Approach**

The technical approach (10 pages maximum) will detail the team's method to realize a vehicle that supports the program objectives. It will include the baseline capabilities of the existing vehicle (if any) and describe the framework that will create a robust and reliable realization of an autonomous vehicle capable of operating safely in an urban environment. A preliminary high level architecture discussion should describe the basic design tradeoffs in arriving at the final design. Attention should be given to the behaviors listed in the program objectives. The task description and milestone schedule (Section 3.2.8.2) should follow directly from the approach detailed in this section. Existing assets including vehicle platform and subsystems should be described.

In addition to the technical approach narrative, the proposer may optionally submit a 5-minute video of the autonomous vehicle they propose to use in the program. The video may be used to make clear the capabilities of the vehicle that relate to the program objectives. Narration may be used on the video soundtrack to explain the action shown in the demonstration. Absence of a video with a proposal will not result in a lower rating.

### **3.2.7 Team Description**

The team description section (8 pages maximum) will discuss the background of the key individuals who will participate in this program, the amount of time they will spend on the program, and whether they will be paid with Urban Challenge award funds. This section should describe the role of all major subcontractors, including company or business unit backgrounds in this area. Past performance on relevant programs by the prime and major subcontractors should include references and points of contact. A brief description of available test facilities should be included.



### **3.2.8 Management and Funding Plan**

The management plan (12 pages maximum) will describe the execution of the technical approach, test planning, and the allocation of work and resources among the team. This section should include the following:

#### **3.2.8.1 Personnel Plan**

This section should show how the team proposes to manage the project, including descriptions of the key functions and identification of the individuals who serve these functions. This section should also include the tasking and time allocation of key personnel. Resources from outside the program, if any, should be identified.

#### **3.2.8.2 Task Breakdown and Milestone Schedule**

This section should present the work breakdown structure and major milestones necessary to support the program goals and schedule. The internal development schedule should be described by task to meet the DARPA-mandated milestones. The tasks in the task breakdown should correspond to the development plan presented in Section 3.2.6.

#### **3.2.8.3 Cost**

This section should present a breakdown of the projected costs by category (e.g., major equipment, labor to include categories of personnel and hours and labor rates per category, indirect costs, other direct costs, and travel) and by task. This section should indicate clearly the specific tasks to be funded through the Urban Challenge program.

#### **3.2.8.4 Funding Plan**

This section should detail the plan for funding participation in the program. Amounts and sources of funds should be indicated, including Governmental and non-Governmental sources. The plan for obtaining these funds should be discussed.

#### **3.2.8.5 Export Laws and Regulations**

After determining if any proposed technology development will be subject to applicable export laws and regulations (such as the ITAR 22 C.F.R. 120-130) proposers must either affirmatively state these export laws and regulations are not applicable or describe the plan to address these restrictions as they apply to the Urban Challenge.

### **3.2.9 Proposed Agreement: Attachment A**

Attachment A is not applicable for proposers specifying FAR contract vehicles.

As the basis for negotiations, the proposer will include the proposed agreement document with his/her submission. The proposed agreement will be based on the model agreement included in Appendix B of this PIP. The proposed agreement should be edited in a text editor (e.g. Microsoft Word) using the “track changes” option to indicate proposed changes. The model agreement must be customized with specific information related to the proposer. This document will serve as the basis for future negotiation.

In addition to the information required in the body of the model agreement, Section 3.2.8.2, Task Breakdown and Milestone Schedule, must be included as Attachment 1; and Section 3.2.13, Intellectual Property, must be included as Attachment 2.

### **3.2.10 Section 845 Compliance: Attachment B**

Attachment B is not applicable for proposers specifying FAR contract vehicles.

The proposer should indicate (in not more than 2 pages) how Section 845(d) requirements will be met. Additional information may be included to support any claims. For the purposes of this program, the total award is estimated at \$1 million including Government and performer shares (if any).

DARPA plans to award OT agreements under the authority of Section 845 of the National Defense Authorization Act for Fiscal Year 1994, Public Law 103-160 (10 U.S.C. 2371 (note)) for the Urban Challenge program. A copy of Section 845 is provided as Appendix A to this PIP.

Section 845(d) includes specific requirements for proposers specifying the use of an OT. The requirements of Section 845, including those in subsection (d), are applicable to the Urban Challenge program. To meet the provisions of this section, there must be at least one nontraditional Defense contractor participating to a significant extent in the prototype project or, at least one of the following circumstances must exist: at least one-third of the total cost of the prototype project is to be paid with funds provided by parties to the transaction other than the Federal Government; or, the senior procurement executive determines that exceptional circumstances justify the use of a transaction that provides for innovative business arrangements or structures that would not be feasible or appropriate under a contract. The Government has discretion in determining the level of “significant extent.” Some factors may include:

- Criticality of the technology being contributed
- Role of the nontraditional Defense contractor(s) in the development process
- Value of the effort being proposed

If the proposer does not have a nontraditional partner and cannot meet the cost share condition, the proposer may provide justification to enable the senior procurement executive to waive the requirements of Section 845(d). At present, DARPA does not plan to use the exceptional circumstance justification.

A nontraditional Defense contractor is defined as a business unit that has not, for a period of at least 1 year prior to the date of the OT agreement, entered into or performed on:

- Any contract that is subject to full coverage under the cost accounting standards prescribed pursuant to section 26 of the Office of Federal Procurement Policy Act (41 U.S.C. 422) and the regulations implementing such section; or
- Any other contract in excess of \$500,000 to carry out prototype projects or to perform basic, applied, or advanced research projects for a Federal agency, that is subject to the FAR.

### **3.2.11 Organizational Conflict of Interest: Attachment C**

This section (2-page maximum) will disclose the existence or potential existence of organizational conflicts of interest, as defined in FAR 9.501. All proposers and proposed subcontractors must affirmatively state whether they are supporting any DARPA technical office(s) through an active contract or subcontract. All affirmations must state which office(s) the proposer supports and the prime contract number. This disclosure shall include a description of any action the proposer has taken or proposes to take to avoid, neutralize, or mitigate such conflict. If the proposer believes that no such conflict exists, the proposer shall make that statement.

### **3.2.12 Waiver and Release of Indemnity and Liability: Attachment D**

As a condition for award, program performers will sign and notarize a waiver and release of indemnity and liability. At a minimum, this signed form must be returned before negotiations begin. A blank form is provided as Appendix C to this PIP.

### **3.2.13 Intellectual Property Claims: Attachment E**

Proposers are required to submit a listing of any pre-existing noncommercial components of intellectual property to which a claim is asserted. This property may include trade secrets, plans, designs, documentation, software, algorithms, or any other intellectual property. This information may be formatted as shown in Table 1. The list may be amended during the course of the program. The Government may use the list during the source selection process to evaluate the effect of any identified assertions and may request additional information from the proposer, as necessary, to evaluate the proposer's assertions. If no assertions are intended, the proposer should make that statement.

In the final report (Milestone 4), performers will submit a good-faith list of the intellectual property developed under the program and the associated rights assertion. The Government shall have GPR to the specific components of intellectual property created for this program using Government funding in whole or in part.

**Table 1: Format for listing of intellectual property**

<b>NONCOMMERCIAL</b>			
Intellectual Property Component	Basis for Assertion	Asserted Rights Category	Organization Asserting Rights
(LIST)	(LIST)	(LIST)	(LIST)

## **3.3 Administrative Instructions**

A summary of the proposal content is provided in Table 2.

**Table 2: Submission Summary**

<b>PIP Section Reference</b>	<b>Item</b>	<b>Max # Pages</b>	<b># Hard Copies</b>	<b># Electronic Copies</b>	<b>TFIMs upload</b>
3.2.1-3.2.8	Proposal Body	35*	7	1	yes
	Cover Letter	1			
	Cover Page	1			
	Executive Summary	1			
	Table of Contents	1			
	Abbreviations	1			
	Technical Approach	10			
	Team Description	8			
	Management and Funding Plan	12			
3.2.6	Video (optional)	N/A	N/A	1	yes
3.2.9	Attachment A: Proposed Agreement (for teams specifying OT award)	N/A	4	1	yes
3.2.10	Attachment B: 845 Compliance (for teams specifying OT award)	2	4	1	yes
3.2.11	Attachment C: Organizational Conflict of Interest	2	4	1	yes
3.2.12	Attachment D: Waiver and Release of Indemnity and Liability	1	4	N/A	no
3.2.13	Attachment E: Intellectual Property Claims	5	4	1	yes

\*does not include attachments

### 3.3.1 Submission Format

The proposal body will be submitted in paper and electronic forms. The original shall be unbound, with binder clip. Six additional hard copies of the proposal shall be provided, corner-stapled. Each page shall be printed on an 8-1/2" x 11" sheet using Times New Roman 12-point font. The size of text used in tables and figures shall not be smaller than 8 point. All pages should be printed single-sided with 1-inch margins on top, bottom, and sides. The proposal body (not including attachments) shall not exceed 35 pages. Foldouts shall be no larger than 11" x 17" and shall count as two pages. All tables and figures shall be clearly labeled. Proposal pages shall be marked "*Team Name* – Source Selection Sensitive."

One electronic copy of the proposal on a CD-ROM is required. Electronic files must be submitted in a Microsoft Word (2003)-compatible electronic format. Proposers must submit their optional 5-minute vehicle videos in .wmv format and less than 100 MB in size. CD-ROMs should be clearly labeled "DARPA Urban Challenge, *team name*, Program Solicitation Number 06-36."

The proposal attachments should also be submitted in both paper and electronic form. The paper original should be unbound with binder clip, with three additional paper copies corner-stapled. Electronic versions of the attachments are required on the CD-ROM.

The proposed agreement (Appendix A) should be included as a separate electronic document labeled "*Team Name* – Proposed Agreement". The proposed agreement should make use of the "track changes" feature to highlight differences. A downloadable MS-WORD version is available at [www.darpa.mil/grandchallenge](http://www.darpa.mil/grandchallenge).

### **3.3.2 Proposal Delivery**

All responses must be received on or before June 23, 2006 at 5:00 PM Eastern Daylight Time. Late responses will not be accepted.

The proposal shall be mailed or hand carried to:

Defense Advanced Research Projects Agency (DARPA)  
Urban Challenge Program  
Attn: Contracts Management Office/Kristen Fuller  
BAA: 06-36  
3701 North Fairfax Drive  
Arlington, VA 22203-1714

Responses and response modifications (accepted prior to the deadline only for receipt of response) shall be submitted in sealed envelopes or packages to the above address and marked with the following information on the outer wrapping:

Proposer's name and return address  
The response receipt address above  
BAA: 06-36  
Date:

Proposers must enter their proposals into the DARPA TFIMS system before the proposal due date. Proposers should follow the instructions for BAA06-36 at [www.darpa.mil/grandchallenge](http://www.darpa.mil/grandchallenge). As there may be a delay in establishing a password for this system, proposers should start this process well in advance.

### **3.4 Communication with DARPA**

Upon release of the solicitation and until program awards are announced, all discussions with DARPA regarding the solicitation, proposals, or any issue relating to source selection can only be in the form of questions through the Contracting/Agreements Officer. Email questions regarding this solicitation to [baa06-36@darpa.mil](mailto:baa06-36@darpa.mil). Questions submitted to the DARPA Grand Challenge mailbox or to the Grand Challenge staff will not be answered.

Proposers are advised that employees of support contractors may be called upon as subject matter experts in the source selection process. These individuals will execute nondisclosure statements and will be authorized access only to those portions of the proposal data that are necessary to enable them to perform their duties. Such firms are expressly prohibited from competing on the subject acquisition and from proposal ranking or recommending the selection of a source. By submission of a proposal, the team agrees that proposal information may be disclosed to these selected individuals for the limited purpose stated here.

One copy of each unsuccessful proposal will be retained by DARPA for 3 months. All other copies will be destroyed 1 month after final award. No destruction certification will be furnished.

### **3.5 Award Announcement**

Teams will be contacted through the administrative point of contact by email and telephone prior to the announcement of awards in FedBizOpps ([www.fedbizopps.gov](http://www.fedbizopps.gov)). Upon completion of the contracting process, DARPA will coordinate the public announcement of program awards. Performers must delay the release of all information regarding program awards pending clearance from DARPA.

### **3.6 Prior Research**

Technical papers from prior Grand Challenge teams are available at [www.darpa.mil/grandchallenge](http://www.darpa.mil/grandchallenge). DARPA does not ensure the accuracy of this information and these references are provided only as a recognition of prior art.

### **3.7 Objections**

Any objections to the terms of this solicitation or to the conduct of receipt, evaluation or award of agreements must be presented in writing within 10 calendar days of the release of this solicitation, or the date the objector knows or should know the basis for its objection. Objections shall be provided in letter format, clearly stating that the objection to this solicitation or to the conduct of evaluation or award of a contract/agreement and providing a clearly detailed, factual statement of the basis for objection. Failure to comply with these directions is a basis for summary dismissal of the objection. Objection letters should be mailed to the address listed in the proposal delivery information listed in section 3.3.2.

## **4. Evaluation Criteria**

Award selection will be based on the evaluation of proposals using the criteria outlined below. Awards will be made based on the best value to the Government. The Government reserves the right to award zero, one, or multiple contracts or agreements under this BAA and to award without discussion.

### **4.1 Evaluation Factor Weighting**

Proposals will be evaluated against the following factors, in descending order of importance:

- Technical approach
- Management and Funding Plan
- Strength of team

Successful proposals will exhibit a strong grasp of the specific tasks necessary to develop and test a vehicle that is able to meet all the milestone exit criteria. A successful effort will assemble a well-managed, experienced, multifunctional team that will combine needed resources and talent to build on a mature technology base. The development plan will reflect cost and schedule realism and present a credible approach to meeting program goals with available resources.

### **4.2 Technical Approach Factors**

The following factors are weighted equally.

- Proposer has a credible technical approach to field an autonomous vehicle that meets all vehicle criteria and is a suitable platform for development as an autonomous vehicle.
- Proposer has a credible technical approach to configure the vehicle a clear grasp of requirements imposed by safe navigation and obstacle avoidance in an urban environment.
- Proposer presents a clear understanding and credible technical approach for developing a real-time processing system that will support program goals, including situation awareness and tracking of moving and stationary vehicles in the environment.
- Proposer presents a clear grasp of issues in implementing context-dependent vehicle behaviors required in various traffic situations, including vehicle routing and rerouting strategies.

### **4.3 Management and Funding Plan Factors**

The following factors are weighted equally.

- Task breakdown describes a realistic, executable, and credible path for implementing the technical approach and achieving the milestone exit criteria.
- The proposal describes a well-managed project with clear functional lines, committed individual performers, and a detailed plan to integrate and manage the work of the subcontractors.
- A credible plan exists to combine adequate resources and personnel to perform tasks to meet milestones and realize program goals.
- The proposer has realistic total cost estimates and a realistic plan to obtain funding adequate to cover the costs.

### **4.4 Strength of Team Factors**

The following factors are weighted equally.

- The proposer lead has a proven background in the development, integration, and testing of robotic vehicles.
- The team shows depth, breadth, and balance in combining organizations and individuals to address all required disciplines, including testing.
- The proposer brings to the program a mature technology base to enable timely development to meet program milestones.

### **4.5 Scoring**

Proposal ratings will range 1 through 4, where 4 is the highest rating and 1 is the lowest rating.

The ratings represent the following standards of achievement:

- 4:** Far exceeds the average standards of DARPA's expectations and exceeds the development, maturity, and functionality required in the PIP. The solution demonstrates a high degree of understanding and is a mature, realistic, well

structured, and thoughtful solution. Has a clear, workable plan that is achievable within the milestone schedule. No major weaknesses.

- 3:** Generally meets expectations given maturity of design and schedule progress to this point. Shows the ability to meet and possibly exceed the standards of development, maturity, and functionality required in the PIP. Has a clear, workable plan that is realistic and achievable with minimal risk in the milestone schedule. Few major weaknesses.
- 2:** Given the design maturity and schedule to this point, the solution meets some (but not all) of the average standards and functionality required in the PIP. Has a plan that is achievable with a moderate amount of risk in the milestone schedule. Plan seems unrealistic, or realism cannot be assessed with data provided. A number of major or minor weaknesses.
- 1:** Does not meet most of the average standards of development, maturity, and functionality required in the PIP. This area lacks sufficient detail to demonstrate an understanding of the purpose and goals. The plan, as documented, in this area is very risky to meet the milestone schedule. Plan is not realistic. A significant number of major and minor weaknesses.



# Appendix A: Section 845 Other Transactions Authority

## Section 845: Other Transactions Authority

(a) Authority.--(1) Subject to paragraph (2), the Director of the Defense Advanced Research Projects Agency, the Secretary of a military department, or any other official designated by the Secretary of Defense may, under the authority of section 2371 of title 10, United States Code [this section], carry out prototype projects that are directly relevant to weapons or weapon systems proposed to be acquired or developed by the Department of Defense, or to improvement of weapons or weapon systems in use by the Armed Forces.

(2) The authority of this section--

(A) May be exercised for a prototype project that is expected to cost the Department of Defense in excess of \$20,000,000 but not in excess of \$100,000,000 only upon a written determination by the senior procurement executive for the agency (as designated for the purpose of section 16(c) of the office of Federal procurement policy act (41 U.S. Code 414(c))) that--

(i) the requirements of subsection (d) [of this note] will be met; and

(ii) the use of the authority of this section [of this note] is essential to promoting the success of the prototype project; and

(B) May be exercised for a prototype project that is expected to cost the Department of Defense in excess of \$100,000,000 only if--

(i) The Under Secretary of Defense for Acquisition, Technology, and Logistics determines in writing that--

(I) the requirements of subsection (d) [of this note] will be met; and

(II) the use of the authority of this section is essential to meet critical national security objectives; and

(ii) the congressional defense committees are notified in writing at least 30 days before such authority is exercised.

(3) The authority of a senior procurement executive under paragraph (2)(A), and the authority of the Under Secretary of Defense for Acquisition, Technology, and Logistics under paragraph (2)(B), may not be delegated.

(b) Exercise of authority.--(1) Subsections (e)(1)(B) and (e)(2) of such section 2371 [subsections (e)(1)(B) and (e)(2) of this section], shall not apply to projects carried out under subsection (a).

(2) To the maximum extent practicable, competitive procedures shall be used when entering into agreements to carry out projects under subsection (a).

(c) Comptroller General review.--(1) Each agreement entered into by an official referred to in subsection (a) to carry out a project under that subsection that provides for payments in a total amount in excess of \$5,000,000 shall include a clause that provides for the Comptroller General, in the discretion of the Comptroller General, to examine the records of any party to the agreement or any entity that participates in the performance of the agreement.

(2) The requirement in paragraph (1) shall not apply with respect to a party or entity, or a subordinate element of a party or entity, that has not entered into any other agreement that provides for audit access by a Government entity in the year prior to the date of the agreement.

## Appendix A: Section 845 Other Transactions Authority

(3)(A) The right provided to the Comptroller General in a clause of an agreement under paragraph (1) is limited as provided in subparagraph (B) in the case of a party to the agreement, an entity that participates in the performance of the agreement, or a subordinate element of that party or entity if the only agreements or other transactions that the party, entity, or subordinate element entered into with Government entities in the year prior to the date of that agreement are cooperative agreements or transactions that were entered into under this section or section 2371 of title 10, United States Code.

(B) The only records of a party, other entity, or subordinate element referred to in subparagraph (A) that the Comptroller General may examine in the exercise of the right referred to in that subparagraph are records of the same type as the records that the Government has had the right to examine under the audit access clauses of the previous agreements or transactions referred to in such subparagraph that were entered into by that particular party, entity, or subordinate element.

(4) The head of the contracting activity that is carrying out the agreement may waive the applicability of the requirement in paragraph (1) to the agreement if the head of the contracting activity determines that it would not be in the public interest to apply the requirement to the agreement. The waiver shall be effective with respect to the agreement only if the head of the contracting activity transmits a notification of the waiver to Congress and the Comptroller General before entering into the agreement. The notification shall include the rationale for the determination.

(5) The Comptroller General may not examine records pursuant to a clause included in an agreement under paragraph (1) more than three years after the final payment is made by the United States under the agreement.

(d) Appropriate use of authority.--(1) The Secretary of Defense shall ensure that no official of an agency enters into a transaction (other than a contract, grant, or cooperative agreement) for a prototype project under the authority of this section unless--

(A) there is at least one nontraditional defense contractor participating to a significant extent in the prototype project; or

(B) no nontraditional defense contractor is participating to a significant extent in the prototype project, but at least one of the following circumstances exists:

(i) At least one third of the total cost of the prototype project is to be paid out of funds provided by parties to the transaction other than the Federal Government.

(ii) The senior procurement executive for the agency (as designated for the purposes of section 16(3) of the Office of Federal Procurement Policy Act (41 U.S. Code 414(3))) determines in writing that exceptional circumstances justify the use of a transaction that provides for innovative business arrangements or structures that would not be feasible or appropriate under a contract.

(2)(A) Except as provided in subparagraph (B), the amounts counted for the purposes of this subsection as being provided, or to be provided, by a party to a transaction with respect to a prototype project that is entered into under this section other than the Federal Government do not

## Appendix A: Section 845 Other Transactions Authority

include costs that were incurred before the date on which the transaction becomes effective.

(B) Costs that were incurred for a prototype project by a party after the beginning of negotiations resulting in a transaction (other than a contract, grant, or cooperative agreement) with respect to the project before the date on which the transaction becomes effective may be counted for purposes of this subsection as being provided, or to be provided, by the party to the transaction if and to the extent that the official responsible for entering into the transaction determines in writing that--

(i) the party incurred the costs in anticipation of entering into the transaction; and  
(ii) it was appropriate for the party to incur the costs before the transaction became effective in order to ensure the successful implementation of the transaction.

(e) Pilot program for transition to follow-on contracts.--(1) The Secretary of Defense is authorized to carry out a pilot program for follow-on contracting for the production of items or processes under prototype projects carried out under this section.

(2) Under the pilot program--

(A) a qualifying contract for the procurement of such an item or process, or a qualifying subcontract under a contract for the procurement of such an item or process, may be treated as a contract or subcontract, respectively, for the procurement of commercial items, as defined in section 4(12) of the Office of Federal Procurement Policy Act (41 U.S.C. 403(12)); and

(B) the item or process may be treated as an item or process, respectively, that is developed in part with Federal funds and in part at private expense for the purposes of section 2320 of title 10, United States Code.

(3) For the purposes of the pilot program, a qualifying contract or subcontract is a contract or subcontract, respectively, with a nontraditional defense contractor that--

(A) Does not exceed \$50,000,000; and

(B) Is either--

(i) a firm, fixed-price contract or subcontract; or  
(ii) a fixed-price contract or subcontract with economic price adjustment.

(4) The authority to conduct a pilot program under this subsection shall terminate on September 30, 2008. The termination of the authority shall not affect the validity of contracts or subcontracts that are awarded or modified during the period of the pilot program, without regard to whether the contracts or subcontracts are performed during the period.

(f) Nontraditional defense contractor defined.--In this section, the term 'nontraditional defense contractor' means an entity that has not, for a period of at least one year prior to the date that a transaction (other than a contract, grant, or cooperative agreement) for a prototype project under the authority of this section is entered into, entered into or performed with respect to--

## Appendix A: Section 845 Other Transactions Authority

(1) any contract that is subject to full coverage under the cost accounting standards prescribed pursuant to section 26 of the Office of Federal Procurement Policy Act (41 U.S. Code 422) and the regulations implementing such section; or

(2) any other contract in excess of \$500,000 to carry out prototype projects or to perform basic, applied, or advanced research projects for a Federal agency, that is subject to the Federal Acquisition Regulation.

(g) Follow-on production contracts.--(1) A transaction entered into under this section for a prototype project that satisfies the conditions set forth in subsection (d)(1)(B)(i) [of this note] may provide for the award of a follow-on production contract to the participants in the transaction for a specific number of units at specific target prices. The number of units specified in the transaction shall be determined on the basis of a balancing of the level of the investment made in the project by the participants other than the Federal Government with the interest of the Federal Government in having competition among sources in the acquisition of the product or products prototyped under the project.

(2) A follow-on production contract provided for in a transaction under paragraph (1) may be awarded to the participants in the transaction without the use of competitive procedures, notwithstanding the requirements of section 2304 of title 10, United States Code [10 U.S.C.A. § 2304], if--

(A) competitive procedures were used for the selection of parties for participation in the transaction;

(B) the participants in the transaction successfully completed the prototype project provided for in the transaction;

(C) the number of units provided for in the follow-on production contract does not exceed the number of units specified in the transaction for such a follow-on production contract; and

(D) the prices established in the follow-on production contract do not exceed the target prices specified in the transaction for such a follow-on production contract."

(h) Applicability of procurement ethics requirements.--An agreement entered into under the authority of this section shall be treated as a Federal agency procurement for the purposes of section 27 of the Office of Federal Procurement Policy Act (41 U.S.Code 423).

(i) Period of authority.--The authority to carry out projects under subsection (a) shall terminate at the end of September 30, 2008.

## Appendix B. Model Agreement

### AGREEMENT BETWEEN

*(INSERT PERFORMER NAME AND ADDRESS)*

AND  
THE DEFENSE ADVANCED RESEARCH PROJECTS AGENCY  
3701 North Fairfax Drive  
Arlington, VA 22203-1714

CONCERNING:  
Urban Challenge Program

Agreement No.: **HR0011-06-9-XXXX**

DARPA Order No.: **TBD**

Total Estimated Government Funding of the Agreement: \$ **TBD**

Performer's Cost Share/Contribution: \$ **TBD**

Funds Obligated: \$ **TBD**

Authority: 10 U.S.C. 2371 and Section 845 of the 1994 National Defense Authorization Act for Fiscal Year 1994, as amended.

Line of Appropriation: **TBD**

This Agreement is entered into between the United States of America, hereinafter called the Government, represented by The Defense Advanced Research Projects Agency (DARPA), and the *(INSERT PERFORMER NAME)* pursuant to and under U.S. Federal law.

FOR *(INSERT PERFORMER NAME)*

FOR THE UNITED STATES OF AMERICA  
THE DEFENSE ADVANCED  
RESEARCH PROJECTS AGENCY

\_\_\_\_\_  
*(Name)*  
*(Title)*

\_\_\_\_\_  
*(Date)*

\_\_\_\_\_  
*Kristen Huff Fuller*      *(Date)*  
*DARPA Agreements Officer*

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## **ARTICLE I. SCOPE OF THE AGREEMENT**

The DARPA Urban Challenge program is seeking to advance the state of knowledge in the area of ground robotic vehicles by demonstrating a field of vehicles operating fully autonomously in a complex urban environment which includes moving vehicular and pedestrian traffic.

In the National Defense Authorization Act for Fiscal Year 2001, Public Law 106-398, Congress mandated in Section 220 that “It shall be a goal of the Armed Forces to achieve the fielding of unmanned remotely controlled technology such that . . . by 2015, one-third of the operational ground combat vehicles are unmanned.” In defining the Urban Challenge, DARPA is advancing technology to address the operational challenges implicit in the Congressional mandate. Safe and effective operation in an urban environment is a fundamental requirement for all future military missions for ground autonomous vehicles.

The Urban Challenge program is the third DARPA Grand Challenge and a direct outgrowth of the DARPA Grand Challenge 2005 autonomous vehicle competition that was conducted in October 2005. This event focused on autonomous vehicles that operate in an off-road environment with only limited inter-vehicle interaction. Urban Challenge is concerned with the development of vehicles that can safely execute missions in a complex urban environment with moving traffic and interaction between vehicles in a variety of traffic configurations.

Under this Agreement, DARPA and the Performer are bound to each other by a duty of good faith and best effort in achieving the program objectives. DARPA will obtain access to program results and certain rights to patents and data pursuant to Articles VIII and IX. DARPA will have continuous involvement with the Performer in the course of managing this effort.

This Agreement is an ‘Other Transaction’ pursuant to 10 U.S.C. 2371 and Section 845 of the 1994 National Defense Authorization Act, as amended. The Parties agree that the purpose of this Agreement is to acquire the Performer’s best efforts to develop and demonstrate a system that meets all milestone exit criteria to include an attempt at the Urban Challenge course. The Federal Acquisition Regulation (FAR) and Department of Defense FAR Supplement (DFARS) apply only as specifically referenced herein. This Agreement is not intended to be, nor shall it be construed as, by implication or otherwise, a partnership, a corporation, or other business organization. The terms in this document describe the complete and entire Agreement between DARPA and the Performer.

For purposes of this Agreement, “Performer” refers to the individual or organization that is signatory to this Agreement. “Team Member” refers to the Performer or any other individual, organization, or subcontractor affiliated with the Performer that is supported by the funding supplied through this Agreement for the purpose of achieving the Urban Challenge program objectives.

## **ARTICLE II. TERM**

### **A. The Term of this Agreement**

This agreement commences upon the date of the last signature hereon and continues until December 31, 2007.

### **B. Termination Provisions**

Subject to a reasonable determination that this Agreement will not produce beneficial results commensurate with the expenditure of resources, either Party may terminate this Agreement by written notice to the other Party, provided that such written notice is preceded by consultation between the Parties. In the event of a termination of the Agreement, it is agreed that disposition of data developed under this Agreement, shall be in accordance with the provisions set forth in Articles VIII and IX. The Government and Performer will negotiate in good faith a reasonable and timely adjustment of all outstanding issues between the Parties as a result of termination. Failure of the Parties to agree to a reasonable adjustment will be resolved pursuant to Article VII, Disputes. The Government has no obligation to reimburse the Performer beyond the last completed and paid milestone.

### **C. Extending the Term**

The Parties may extend by mutual written agreement the term of this Agreement if funding availability and research opportunities reasonably warrant. Any extension shall be formalized through modification of the Agreement by the Agreements Officer and the Contract Administrator.

## **ARTICLE III. STATEMENT OF OBJECTIVES**

To meet the program objectives, *(INSERT PERFORMER NAME)* shall perform the work required as described in the Task Breakdown and Milestone Schedule (Attachment 1). Specifically, the goal of this effort is development of a vehicle with the following demonstrated capabilities:

- Complete a mission defined by an ordered series of checkpoints in a complex route network. The vehicle will have 5 minutes to process a mission description before attempting the course.
- Interpret static lane markings (e.g., white and yellow lines) provided with the route network definition file and behave in accordance with applicable traffic laws and conventions.
- Exhibit context-dependent speed control to ensure safe operation, including adherence to speed limits.
- Exhibit safe-following behavior when approaching other vehicles from behind in a traffic lane. This includes maintaining a safe-following distance.
- Exhibit safe check-and-go behavior when pulling around a stopped vehicle, pulling out of parking spot, moving through intersections, and in situations where collision is possible.



- Stay on the road and in a legal and appropriate travel lane while en route, including around sharp turns, through intersections, and while passing. The route network definition file will specify the GPS coordinates of the stop signs.
- Navigate safely in areas where GPS signals are partially or entirely blocked.
- Follow paved and unpaved roads and stay in lane with very sparse or low accuracy GPS waypoints.
- Change lanes safely when legal and appropriate, such as when passing a vehicle or entering an opposing traffic lane to pass a stopped vehicle. Vehicles must not pass other vehicles queued at an intersection.
- Merge safely with traffic moving in one or more lanes after stopping at an intersection.
- Pull across one lane of moving traffic to merge with moving traffic in the opposing lane.
- Stop safely within 1 meter of the stop line at a stop sign intersection and proceed without excessive delay (less than 10 seconds) according to intersection precedence rules.
- Exhibit proper queue behavior at an intersection, including stopping at a safe distance from other vehicles and stop-and-go procession to the stop line without excessive delay.
- Navigate toward a destination in a large, open area where minimal or no GPS points are provided, as in loading dock areas or parking lots. These areas may contain fixed obstacles such as parked vehicles and moving obstacles including other vehicles and pedestrians.
- Safely pull into and back out of a specified parking space in a parking lot.
- Safely execute one or more three-point turning maneuvers to effect a U-turn.
- Dynamically re-plan and execute the route to a destination if the primary route is blocked or impassable.

## **ARTICLE IV. PAYABLE EVENT SCHEDULE AND DELIVERABLES**

### **A. Payment Schedule**

The Performer shall perform the work required to meet the Article III Objectives as described in the Task Breakdown and Milestone Schedule (see Attachment 1) to meet the Program's Payable Milestone schedule. The Performer shall be paid for each Payable Milestone accomplished and delivered in accordance with the Schedule of Payments and Payable Milestones set forth below. Both the Schedule of Payments and the Funding Schedule set forth below may be revised or modified in accordance with subparagraph C of this article.

### **B. Schedule of Payments and Payable Milestones**

<b>MS</b>	<b>Date</b>	<b>Description</b>	<b>% of Government Share</b>
1	2 weeks after contract award	Kickoff Meeting	50
2	June 1 – July 15, 2007	Site Visit	25
3	October 20-31, 2007	National Qualification Event – Navigation Element	10
4	October 20 – December	National Qualification Event – Traffic	15

	31, 2007	Element, Attempt on Urban Challenge course	
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The performer's progress in the program is measured by performance at a series of mandatory milestone meetings with associated deliverables, milestone exit criteria, and payment for completion. Continuation in the program is contingent upon performance at these events. If the Performer does not achieve the required level of performance at any milestone, the Performer may be discontinued from the program, or may be allowed to continue in the program with a delay in the milestone payment pending satisfactory completion of the exit criteria at the discretion of DARPA. The milestones are specifically defined as follows:

### **Milestone 1:**

Purpose: Kickoff meeting

Date: Approximately 2 weeks after program award

Location: Performer site in the United States

Format: Performer presentations and demonstration

Special Preparation: none

Activities: Performer presentation of vehicle development and test plan, followed by optional field demonstration of baseline vehicle capabilities. This plan should discuss autonomous system theory of operation and associated technical risk.

Deliverables: Vehicle development plan and associated briefing material

Behaviors under test: none

Exit criteria: Delivery of concise but complete development plan including discussion of cost, schedule, and internal development milestones

Notification: Within 10 business days after milestone event

Milestone payment target: 50 % of Government share

### **Milestone 2:**

Purpose: Site visit demonstration

Date: Between June 1 and July 15, 2007; maximum 4-hour test

Location: Performer test course in the United States

Format: Performer will demonstrate vehicle capabilities on a test course using a procedure that complies with DARPA requirements. DARPA officials will follow autonomous vehicle in a DARPA-supplied vehicle.

Special Preparation: Performer will create and mark a test course between 300m and 1000m in length per DARPA's specifications and submit to DARPA a course layout and route network demonstration file at least 30 days prior to the demonstration. Performer will provide a "traffic-vehicle" (including driver), and one additional control vehicle. Performer is responsible for safety plan and safe execution of the test.

Activities: Vehicle will perform safety test, navigation test (without moving traffic-vehicle) and traffic test (with moving traffic-vehicle). Specific test missions will be specified on-site by DARPA.

Deliverables: Technical paper written to DARPA specifications.

Vehicle requirements:

- Vehicle must be built upon a full-size stock chassis or have a documented safety record. Vehicles smaller than a midsize commercial automobile do not meet this requirement. Golf cart-type or all terrain vehicles (ATVs) do not meet this requirement.
- Vehicle must be convertible to and from autonomous operation and human operation within 5 minutes. Human operation may include teleoperation.
- Vehicle must be capable of integrating the DARPA-supplied E-stop and tracking system. Details are available at [http://www.darpa.mil/grandchallenge05/Estop\\_Guidance.pdf](http://www.darpa.mil/grandchallenge05/Estop_Guidance.pdf).
- Vehicle must be capable of navigating autonomously at 30 mph.
- Vehicle must be capable of avoiding stationary and moving obstacles while moving forward and in reverse.
- All sensors and navigation equipment must be fully contained within, or permanently attached to, the vehicle.
- Vehicle must be capable of loading a mission description file via a standard USB 2.0 flash drive.
- Vehicle must have directional signals, brake lights, and reverse lights. These lights must operate as required by California state law.
- Vehicle shall display a flashing amber warning light that is visible at all angles around the vehicle. The warning light shall operate when, and only when, the vehicle is in autonomous mode. The vehicle shall produce an intermittent warning sound that produces approximately 85 dBA at 10 feet when, and only when, the vehicle is operating autonomously. The vehicle may not commence movement until the warning sound and warning light have been in operation for 5 seconds.
- Vehicle must comply with all applicable local, state, and Federal laser, electromagnetic emission, and acoustic safety regulations including OSHA 29 CFR 1926.54, OSHA 29 CFR 1910.97, and OSHA 29 CFR 1910.95. All emitters must pose no hazard of any kind to humans near the vehicle.
- Vehicle is prohibited from using wireless connections in autonomous mode except from navigation systems such as GPS. The use of wireless signals for teleoperation or diagnostics is allowed when the vehicle is not in autonomous mode. A vehicle may emit and receive signals to sense the environment. Vehicles may record video or other data onboard for later review.
- Vehicle must have a wireless emergency stop (E-stop) system for use at the Milestone 2 demonstration.
- Vehicle must be equipped with an externally-actuated manual E-stop pushbutton capability that, upon activation, promptly brings the vehicle to a complete stop and disables the vehicle. At least one pushbutton and its labeling must be easily visible and accessible on each side of the vehicle.

Criteria for safety test:

- E-stop brings the vehicle traveling at 20 mph to a smooth, controlled, and complete rolling stop in less than 20 meters after E-stop activation

Criteria for basic navigation test:

- Vehicle is in autonomous mode and ready to begin run less than 5 minutes after receipt of the MDF from DARPA.

- Vehicle front bumper passes over each checkpoint in DARPA MDF in the correct lane and the correct sequence.
- Vehicle stays in travel lanes at all times unless exiting lane to avoid obstacle.
- Vehicle always stops so front bumper is within 1 meter of stop line at intersection.
- Vehicle always exhibits less than 10-second delay before proceeding at clear intersection.
- Vehicle exhibits safe behavior at all times to avoid collisions and near-collisions as judged by DARPA.
- Vehicle demonstrates ability to leave lane, pass a stopped car or obstacle, and return directly to travel lane. Complete maneuver takes place within 40 meters.
- Vehicle maintains a minimum safety separation of 8 meters fore and aft when executing a passing maneuver.
- Vehicle speed conforms to limits set in DARPA MDF.

Criteria for basic traffic test:

- Vehicle meets all criteria for navigation test.
- Vehicle exhibits proper precedence order at every intersection and does not proceed out of turn.
- Vehicle never comes closer than 15 meters when following a moving lead vehicle traveling at 15 mph on an urban course with 20 mph speed limit.
- Vehicle stays within 40 meters when following a moving lead vehicle traveling at 15 mph on an urban course with 20 mph speed limit.
- Vehicle stops between 5 and 10 meters behind a stopped lead vehicle.

Technical paper criteria: The technical paper should be structured and formatted for publication in a professional journal. It should describe the vehicle design including detailed descriptions of architecture, theory of operation, major subsystems, and vehicle behavior model and should offer a complete understanding of the performer's technical accomplishment.

Exit criteria:

- Vehicle meets vehicle requirements.
- Vehicle demonstrates that it meets all criteria for safety, basic navigation and basic traffic tests as directed by DARPA.
- Technical paper meets criteria and is accepted by DARPA.

Notification: Within 45 days after Milestone 2 event

Milestone payment target: 25 % of Government share

### **Milestone 3**

Date: October 20 – 31, 2007

Location: NQE site in western United States

Format: Performer vehicle will demonstrate E-stop safety attempt to complete a mission across a DARPA-defined route network

Special preparation: Government will provide E-stop system after Milestone 2 notification.

Performer must integrate and test Government-furnished E-stop and tracking system prior to arrival at the test site

Deliverables: none

Criteria for safety test:

- Government-furnished E-stop is installed to allow Government to track system on the test course.
- Government-furnished E-stop brings the vehicle traveling at 20 mph to a smooth, controlled, and complete rolling stop in less than 20 meters after E-stop activation.

Criteria for advanced navigation test:

- Vehicle satisfies all navigation test criteria from Milestone 2.
- Vehicle exhibits correct parking lot behavior, including ability to pull forward into and reverse out of specified parking spot without collision and with less than 10 seconds of excess delay.
- Vehicle demonstrates ability to negotiate obstacle field safely and effectively, with no collisions and with less than 10 seconds of excess delay.
- Vehicle conducts maneuvers necessary to achieve objective checkpoints, including U-turns and route re-planning when roads are blocked. A U-turn may be effected through one or more three-point turns.
- Vehicle navigates roads with sparse or low-accuracy waypoints, including ability to stay in travel lane through road-following by sensing berms or road edges, or by any other sensor-based technique.

Exit criteria:

- Vehicle meets vehicle requirements and basic traffic test criteria from Milestone 2.
- Vehicle meets all criteria for safety and advanced navigation test for Milestone 3.

Notification: Within 48 hours after Milestone 3 event completion

Milestone payment target: 10 % of Government share

## **Milestone 4**

Date: October 20 – December 31, 2007

Location: NQE site in western United States

Format: Vehicle capabilities will be assessed in a series of tests to measure the ability to meet the program objectives. This milestone includes participation in the Urban Challenge final event

Special Preparation: none

Deliverables: Final report is due before December 31, 2007.

Criteria for advanced traffic test:

- Vehicle satisfies all requirements for the advanced navigation test from Milestone 3.
- Vehicle pulls safely into traffic, maintaining minimum 8 meters fore and aft spacing between vehicles at all times during maneuver.

- Vehicle does not exhibit excessive delay when pulling into traffic moving at constant speed. Vehicle should pull into the traffic lane when oncoming vehicles leave a gap of at least 10 seconds between vehicles.
- Vehicle exhibits safe behavior when making left turn across moving traffic and proceeds with less than 10 seconds excess delay.
- Vehicle navigates obstacle area safely and effectively in the presence of moving traffic, operating without collision and with less than 10 seconds excess delay.
- Vehicle navigates parking area in presence of moving traffic including parking in designated location safely and effectively, without collision and with less than 10 seconds excess delay.

Final report requirements:

- Concise and complete report of all technical accomplishments, including lessons learned
- Full report and description of intellectual property created under the Urban Challenge program.

Exit criteria:

- Vehicle meets exit criteria from Milestone 3.
- Vehicle meets Milestone 4 advanced traffic test requirements.
- Vehicle attempts Urban Challenge final event.
- Submission of final report that meets DARPA requirements

Notification: Within 15 days after receipt of all deliverables

Milestone payment target: 15 % of Government share

### C. Modifications

1. At any time during the term of the Agreement, progress or results may indicate that a change in the Statement of Objectives and/or the Payable Milestones would be beneficial to the Program Objectives. Recommendations for modifications, including justifications to support any changes to the Statement of Objectives and/or the Payable Milestones, will be documented in a letter and submitted by the Performer to the DARPA Program Manager with a copy to the DARPA Agreement Officer. This letter will detail the technical, chronological, and financial impact of the proposed modification to the research program. Any resultant modification is subject to mutual agreement of the parties. The Government is not obligated to pay for additional or revised Payable Milestones until and unless the Payable Milestones Schedule is formally revised by the DARPA Agreements Officer and made part of this Agreement.

2. The DARPA Program Manager shall be responsible for the review and verification of milestone accomplishment criteria and any recommendations to revise or otherwise modify the Agreement Statement of Objectives, Schedule of Payments and Payable Milestones, or other proposed changes to the terms and conditions of this Agreement.

3. For minor or administrative Agreement modifications (e.g., changes in the paying office or appropriation data, changes to Government personnel identified in the Agreement, etc.), DARPA shall make these types of changes unilaterally.

4. The Government will be responsible for effecting all modifications to this agreement.

## **ARTICLE V. AGREEMENT ADMINISTRATION**

Administrative and contractual matters under this Agreement shall be referred to the following representatives of the parties:

DARPA: Ms. Kristen Fuller, Agreements Officer, Tel: (703) 696-7579

Performer: *(INSERT NAME) (INSERT TITLE) (INSERT TELEPHONE NUMBER)*

Technical matters under this Agreement shall be referred to the following representatives:

DARPA: Mr. Ron Kurjanowicz, Program Manager, Tel: (703) 696-7583

Performer: *(INSERT NAME) (INSERT TITLE) (INSERT TELEPHONE NUMBER)*

Either party may change its representatives named in this Article by written notification to the other party. The Government will effect the change as stated in subparagraph C.4 of Article IV above.

## **ARTICLE VI. OBLIGATION AND PAYMENT**

### **A. Obligation**

The Government's liability to make payments to the Performer is limited to only those funds obligated under this Agreement or by amendment to the Agreement. DARPA may obligate funds to the Agreement incrementally.

### **B. Payments**

1. The following information shall be included on each invoice:

- Agreement Number
- Invoice Number
- A description of services performed
- Quantity of service received or performed
- The time of period covered by the invoice
- Terms of Payment
- Payment Office
- Amount claimed

2. The Performer shall document each Payable Milestone by submitting deliverables in accordance with the Payable Milestone Schedule and Accomplishment Criteria. The Performer shall submit an original and one (1) copy of all invoices to the Agreements Officer for payment approval. After written verification of the accomplishment of the Payable Milestone by the

DARPA Program Manager, and approval by the Agreements Officer, the invoices will be forwarded to the payment office within fifteen (15) calendar days of receipt of the invoices at DARPA. Payment approval for the final Payable Milestone will be made after reconciliation. Payments will be made by Defense Accounting Office, DFAS, Attention: Vendor Pay, 8899 East 56<sup>th</sup> Street, Indianapolis, IN 46249-1325 within fifteen (15) calendar days of DARPA's transmittal. Subject to change only through written Agreement modification, payment shall be made via electronic funds transfer to the Performer's address set forth below:

3. Bank Account of Payee:

Bank:	<i>(INSERT BANK NAME)</i>
Address:	<i>(INSERT BANK ADDRESS)</i>
Routing Transit Number:	<i>(INSERT ROUTING TRANSIT NO)</i>
Depositor Account Title:	<i>(INSERT DEPOSITER ACCOUNT TITLE)</i>
Depositor Number:	<i>(INSERT DEPOSITER NUMBER)</i>

4. Financial Records and Reports: The Performer's relevant financial records associated with this Agreement are not subject to examination or audit by the Government, except as noted below, since the confirmed accomplishment of the appropriate milestone completes the obligation of both parties.

5. Comptroller General Access to Records: To the extent that the total government payments under this Agreement exceed \$5,000,000, the Comptroller General, at its discretion, shall have access to and the right to examine records of any party to the agreement or any entity that participates in the performance of this agreement that directly pertain to and involve transactions relating to, the agreement for a period of three (3) years after final payment is made. This requirement shall not apply with respect to any party to this agreement or any entity that participates in the performance of the agreement, or any subordinate element of such party or entity, that has not entered into any other agreement (contract, grant, cooperative agreement, or "other transaction") that provides for audit access by a government entity in the year prior to the date of this agreement. This paragraph only applies to any record that is created or maintained in the ordinary course of business or pursuant to a provision of law. The terms of this paragraph shall be included in all sub-agreements to the Agreement.

## **ARTICLE VII. DISPUTES**

### **A. General**

The Parties shall communicate with one another in good faith and in a timely and cooperative manner when raising issues under this Article.

### **B. Dispute Resolution Procedures**

1. Any disagreement, claim or dispute between the Government and the Performer concerning questions of fact or law arising from or in connection with this Agreement, and, whether or not involving an alleged breach of this Agreement, may only be raised under this Article.



2. Whenever disputes, disagreements, or misunderstandings arise, the Parties shall attempt to resolve the issue(s) involved by discussion and mutual agreement as soon as practicable. In no event shall a dispute, disagreement or misunderstanding which arose more than three (3) months prior to the notification made under subparagraph B.3 of this Article constitute the basis for relief under this article unless the Director of DARPA in the interests of justice waives this requirement.

3. Failing resolution by mutual Agreement, the aggrieved Party shall document the dispute, disagreement, or misunderstanding by notifying the other Party (through the DARPA Agreements Officer) in writing of the relevant facts, identify unresolved issues, and specify the clarification or remedy sought. Within five (5) working days after providing notice to the other Party, the aggrieved Party may, in writing, request a joint decision by the DARPA Director, Contract Management Office, and Representative of the Performer ("Performer Representative"). The other Party shall submit a written position on the matter(s) in dispute within thirty (30) calendar days after being notified that a decision has been requested. The Director, Contract Management Office and the Performer Representative shall conduct a review of the matter(s) in dispute and render a decision in writing within thirty (30) calendar days of receipt of such written position. Any such joint decision is final and binding.

4. In the absence of a joint decision, upon written request to the Director of DARPA made within thirty (30) calendar days or upon unavailability of a joint decision under subparagraph B.3 above, the dispute shall be further reviewed. The Director of DARPA may elect to conduct this review personally or through a designee or jointly with a representative of the other Party who is a senior official of the Party. Following the review, the Director of DARPA or designee will resolve the issue(s) and notify the Parties in writing. Such resolution is not subject to further administrative review and, to the extent permitted by law, shall be final and binding.

## **ARTICLE VIII. PATENT RIGHTS**

### **A. Definitions**

1. "Invention" means any invention or discovery which is or may be patentable or otherwise protected under Title 35 of the United States Code.

2. "Made" when used in relation to any invention means the conception or first actual reduction to practice of such invention.

3. "Practical application" means to manufacture, in the case of a composition of product; to practice, in the case of a process or method, or to operate, in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is capable of being utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public on reasonable terms.

4. "Subject invention" means any invention of a Team Member conceived or first actually reduced to practice in the performance of work under this Agreement.

## B. Allocation of Principal Rights

The Performer shall retain the entire right, title, and interest throughout the world to each subject invention consistent with this Article and 35 U.S.C. § 202. With respect to any subject invention in which the Performer retains title, the US Government shall have a non-exclusive, nontransferable, irrevocable, paid-up license to practice or have practiced on behalf of the US Government the subject invention throughout the world. Notwithstanding the above, the Performer may elect to provide full or partial rights that it has retained to Team Members or other parties.

## C. Action to Protect the Government's Interest

1. The Performer agrees to execute or to have executed and promptly deliver to DARPA all instruments necessary to establish or confirm the rights the Government has throughout the world in those subject inventions to which the Performer elects to retain title and to enable the Government to obtain patent protection throughout the world in that subject invention.

2. The Performer shall include, within the specification of any United States patent application and any patent issuing thereon covering a subject invention, the following statement: “This invention was made with Government support under Agreement No. **HR0011-06-9-XXXX** awarded by DARPA. The Government has certain rights in the invention.”

## D. Lower Tier Agreements

The Performer shall include this Article, suitably modified, to identify the Parties, in all subcontracts or lower tier agreements, regardless of tier, for experimental, development, or research work.

## E. Reporting on Utilization of Subject Inventions

The Performer agrees to submit a written report to DARPA Program Manager within 30 days after a patent application is filed regarding a subject invention. In addition, the final report submitted with Milestone 4 shall describe the utilization of any subject inventions or on efforts at obtaining such utilization that are being made by the Performer or its licensees or assignees. The report shall include information regarding the status of development, date of first commercial sale or use, gross royalties received by subcontractor(s), and such other data and information as the agency may reasonably specify. The Performer also agrees to provide additional reports as may be requested by DARPA in connection with any march-in proceedings undertaken by DARPA in accordance with paragraph F of this Article. Consistent with 35 U.S.C. § 202(c)(5), DARPA agrees it shall not disclose such information to persons outside the Government without permission of the Performer.

## F. March-in Rights

The Performer agrees that, with respect to any subject invention in which it has retained title, DARPA has the right to require the Performer, an assignee, or exclusive licensee of a subject invention to grant a non-exclusive license to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if the Performer, assignee, or exclusive licensee refuses such a request, DARPA has the right to grant such a license itself if DARPA determines that:

1. Such action is necessary because the Performer or assignee has not taken effective steps, consistent with the intent of this Agreement, to achieve practical application of the subject invention;
2. Such action is necessary to alleviate health or safety needs that are not reasonably satisfied by the Performer, assignee, or their licensees;
3. Such action is necessary to meet requirements for public use and such requirements are not reasonably satisfied by the Performer, assignee, or licensees; or
4. Such action is necessary because the agreement required by paragraph (I) of this Article has not been obtained or waived or because a licensee of the exclusive right to use or sell any subject invention in the United States is in breach of such Agreement.

## **ARTICLE IX. DATA RIGHTS**

### **A. Definitions**

1. “Government Purpose Rights” (GPR), as used in this article, means rights to use, duplicate, modify or disclose Data, in whole or in part and in any manner, for Government purposes only, and to have or permit others to do so for Government purposes only.
2. “Unlimited Rights”, as used in this article, means rights to use, duplicate, release, modify or disclose, Data in whole or in part, in any manner and for any purposes whatsoever, and to have or permit others to do so.
3. “Data”, as used in this article, means recorded information, regardless of form or method of recording, which includes but is not limited to, technical data, software, trade secrets, and mask works. The term does not include financial, administrative, cost, pricing or management information and does not include subject inventions included under Article VIII.
4. “Limited Rights” as used in this article means the rights to use, modify, reproduce, release, perform, display, or disclose technical data, in whole or in part, within the Government. The Government may not, without the written permission of the party asserting limited rights, release or disclose the data outside the Government, use the technical data for manufacture, or authorize the technical data to be used by another party.

### **B. Allocation of Principal Rights**

1. The Government shall have Unlimited Rights to the performers' vehicle technical data, as described in the Technical Paper & Final Report, to enable the Government to inform stakeholders of technical accomplishments, allow validation of technical claims by independent experts, and facilitate discussion of technical challenges within the broader technical community. This data shall be sufficient to properly convey the performer's approach and generate program advocacy.
2. The Government also shall have GPR to milestone reports and other documentation submitted at milestone meetings and technical interchange meetings.
3. The Government shall have GPR to the specific components of intellectual property created for this program using Government funding. This property may include trade secrets, plans, designs, documentation, software, algorithms, or any other intellectual property. A description of the Proposed Intellectual Property to be developed using Government funding is provided as Attachment 2 to this Agreement for reference. A description of the final delivered Intellectual Property for which the Government shall have GPR is to be provided with the Final Report.

#### C. Marking of Data

Pursuant to paragraph B above, any data delivered under this Agreement shall be marked specifically with the appropriate disclosure legend.

#### D. Lower Tier Agreements

The Performer shall include this Article, suitably modified to identify the Parties, in all subcontracts or lower tier agreements, regardless of tier, for experimental, developmental, or research work.

### **ARTICLE X. CIVIL RIGHTS ACT**

This Agreement is subject to the requirements of Title VI of the Civil Rights Act of 1964 as amended (42 U.S.C. 2000-d) relating to nondiscrimination in employment.

### **ARTICLE XI. GOVERNMENT FURNISHED EQUIPMENT PROPERTY, INFORMATION, FACILITIES AND SERVICES**

The following Government Furnished Equipment, Information, and Facilities shall be provided:

Government Furnished Equipment (GFE):

- E-Stop Transmitter and Receiver to be furnished after Milestone 2. Transmitter will be returned to DARPA at Milestone 3.

Government Furnished Information (GFI):

- Route Network Definition File (RNDF) - to be provided for Milestone 3 and Milestone 4 course events in DARPA-defined format.

- Mission Definition File (MDF) – to be provided at the respective Milestone 2, Milestone 3, and Milestone 4 course events in DARPA-defined format.

Government Furnished Facilities (GFF):

- Milestone 3 and Milestone 4 event sites and test courses in western U.S.

ATTACHMENTS:

ATTACHMENT 1	TASK BREAKDOWN & MILESTONE SCHEDULE
ATTACHMENT 2	PROPOSED INTELLECTUAL PROPERTY LIST

## Appendix C. Waiver and Release of Indemnity and Liability

**General.** The Urban Challenge Program is a technology development program sponsored by the Defense Advanced Research Projects Agency (DARPA) which involves the testing and demonstration of experimental autonomous vehicles. Wireless electronic control remote control devices known as e-stops are used to stop these vehicles in cases where vehicle becomes erratic or dangerous. Because autonomous vehicle technology is immature and inherently dangerous, the behavior of these vehicles is often difficult to predict and accidents may be difficult to prevent. Because the emergency stop system may be unable to stop these vehicles instantaneously, personnel and vehicles operating in the vicinity of these vehicles may be at risk.

Testing of vehicles for the Urban Challenge program will take place both at locations that are both team-specified and DARPA-specified. During the course of the program, vehicles and personnel may be exposed to risk, either at the team-specified location or at a location specified by DARPA. For testing purposes, DARPA may specify the test procedure of the team vehicle, or may specify that more than one autonomous vehicle attempt the test course simultaneously.

**Release of Indemnity.** The undersigned hereby agrees to hold harmless the U.S. Government, the Defense Advanced Research Projects Agency and its employees, and those contractors and employees acting on behalf of DARPA for the Urban Challenge. The undersigned also hereby agrees to hold harmless other contractors or participants in both of these programs for damage that occurs as a result of vehicle interaction or collision on the DARPA test course. The agreement to hold harmless shall be for any and all claims of liability whether by reason of injury or death of any person, or of damage to the property of the Team, or of damage to the competitive position of the Team arising from or connected with participation in the program. The undersigned hereby acknowledges the potential for collision or other damage to their autonomous vehicle due to participation in this event and agrees to hold all parties harmless in this happenstance.

The undersigned certifies that he/she is authorized to waive these rights on behalf of the organization indicated below.

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Authorized Signature and Date

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Team Signatory Printed Name

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Name of Organization